

WO 2005/002885

PCT/EP2004/007171

VO-743

RECEIVED IN THE U.S. PATENT AND TRADEMARK OFFICE
12 DECEMBER 2005

Anti-Skid Spike

The invention relates to an anti-skid spike which can be inserted into an embedding opening in a tread surface, for example of a tire, having an insertion element and a base body with a recess for receiving the insertion element.

Such anti-skid spikes, also called spikes, are used, for example, for improving the adhesion of tires to roadways made slick by snow or ice. It is common to all known systems here that during operation, for example during a steering or braking action, a wear-resistant part of the anti-skid spike penetrates the snow or the ice and in this way clearly increases the interlock of the tire with the ground, and therefore the force which can be transferred. Furthermore, all systems have holding elements or holding areas, most designed in the form of flanges, by means of which the anti-skid spike is held in the rubber of the tire.

Such anti-skid spikes are furthermore used in connection with shoes, horseshoes, snow chains and other devices protected or intended to be protected against skidding.

CONFIRMATION COPY

For assembly, the anti-skid spike is pressed into an embedding opening in the tire tread. The elastic tire material surrounds the flange and fixes it in place.

The wear-resistant element and the holding area can be produced from one piece. It is alternatively possible to employ at least two-part systems, wherein a wear-resistant spike, mainly a hard alloy spike, is inserted into a recess of a holding element. In this case the connection between the spike and the holding element is made by soldering, gluing or pressing. Now the holding element can be produced from an easy to work material with advantageous material properties, such as steel, sintered iron, aluminum or plastic.

A three-piece anti-skid spike is known from DE 25 12 071. This consists of a body element, which is provided with a head flange and in whose outward oriented free end a hard alloy spike is seated, and of a blocking ring, which is loosely looped around the body element, is fastened in the tire tread rubber, and whose exterior diameter is greater than the exterior diameter of the head flange.

This arrangement results in the body element with the hard alloy spike being able to move radially against the restoring forces exerted by the tire rubber when the anti-skid spike encounters the road pavement, while the blocking ring is held stationary in the tire material because of its diameter which is greater than the head flange of the body element. Because of the possibility of movement of the body element and the hard alloy spike, the force with which the hard alloy spike encounters the pavement can be reduced, wherein the actually occurring forces can be affected by

the diameter of the head flange. But the fixedly maintained blocking ring prevents the body element with the hard alloy spike from being thrown out of the tire. The blocking ring here has no effect on the connection between the body element and the hard alloy spike.

An anti-skid spike is known from DE 691 26 448, whose material on the circumferential surface has been hardened and which has a comparatively large diameter. In case of a lateral load because of acceleration, braking or movement through a curve, this anti-skid spike tilts and because of this engages the pavement with the outer edge of its contact face.

It is the object of the invention to create an anti-skid spike of the type mentioned at the outset which can be made of a material combination or shape combination which up to now had not been used or realized, simultaneously along with good dimensional stability.

This object of the invention is attained in that a receiver section is formed on the base body which is at least partially enclosed by a sleeve element, and that in the assembled state the sleeve element is arranged at least in part in the area around the recess.

As is customary, in this arrangement the base body takes on the task of holding the insertion element. In this case the base body can be designed in respect to the selection of its material and/or functioning in such a way that a good fixation in place of the insertion element results. The sleeve element fixes the connection between

the base body and the insertion element. It is possible by means of this to establish a stable connection of the total system. If it is desired, it is also possible to match the sleeve element in respect to its material properties to the wear properties of the entire system. It is possible, for example, for the base body to be made of a more easily wearing material. The total system can be provided with the required wear properties by means of the sleeve element made of a more wear-resistant material.

If appropriately laid out, the sleeve element can stabilize the base body against lateral bending, so that materials other than those used up to now, and possibly also more cost-effective ones, can be used for the base body.

It has been provided in a preferred embodiment that in the assembled state the insertion element projects past the sleeve. By means of this it is achieved that in operation the insertion element is pushed into the snow or ice and clearly increases the interlock of the tire with the ground, and therefore the force which can be transferred.

A particularly easy assembly of the insertion element, simultaneously along with a solid connection with the base body, is achieved in that the insertion element has a cone-shaped section which, in the assembled state, engages a corresponding recess in the base body, and that a positive or non-positive connection between the sleeve element and the receiver section of the base body is formed.

If the insertion element is made of a hard material, preferably a hard alloy, and the sleeve element of a material of lesser wear resistance in comparison with

the insertion element, it is possible to achieve that the insertion element and the material of the tire have wear properties which are matched in such a way that during operations the length of the insertion element protruding in respect to the tire is substantially maintained and the sleeve element and the tread wear at the same rate. The insertion element therefore has the same anti-skid effect over its entire life.

A particularly cost-effective variation provides that the base body is made of a material which is less wear-resistant in comparison with the insertion element and the sleeve element, since the base body definitely determines the material costs because of the large proportion of its volume in respect to the entire component.

A particularly solid and permanent seating of the sleeve element is achieved in that the sleeve element is embodied as a closed ring resting on the entire surface of the receiver section of the base body, as a ring partially resting in segments on it, or as a clamping sleeve in the form of a slit ring.

In a preferred embodiment, the sleeve element has a bezel at one or both of its ends on the longitudinal side, which encircles it at least partially. Because of the bezel which faces the tread surface during the assembly process of the anti-skid spike, the sleeve element slides easily into the assembly opening, the roll-off properties are improved by means of the other bezel, and the noise generation is reduced. A construction of the sleeve element with bezels of identical geometry on both sides is advantageous, because there is no danger of confusion when assembling the sleeve on the receiver section.

A particularly cost-effective and simple to assemble embodiment of the sleeve element provides that the sleeve element is constructed to be rotationally symmetrical.

A particularly good sealing effect of the sleeve element in the tread surface is achieved in that the base body has an flange formed on it, and the diameter of the sleeve element is greater than the diameter of the flange of the base body. The anti-skid spike is provided with seating which is stable against tilting because of the large diameter of the sleeve element, so that its anti-skid effect is improved.

A simple and cost-effective manufacture is achieved in that the receiver section of the base body and the passage in the sleeve element corresponding to it are designed to be cylindrical. If the receiver section of the base body and the passage in the sleeve element corresponding to it are designed to be in the form of a truncated cone, it is possible to achieve a solid connection between the base body and the sleeve element even in case of large manufacturing tolerances. Solid seating of the sleeve element, along with a cost-effective base body, is achieved in that the receiver section of the base body is designed to be cylindrical, and the corresponding passage of the sleeve element in the form of a truncated cone which opens in the direction of the tread surface, because the insertion of the insertion element leads to the base body opening in the shape of a mushroom and to effectively preventing the release of the sleeve element. An embodiment which absorbs manufacturing tolerances and simultaneously assures a solid connection provides for the receiver section of the base body to initially

have a section in the shape of a truncated cone and a cylindrical section following it, wherein the passage in the sleeve element has an area which corresponds to the truncated cone-shaped section of the receiver section, which is followed by a conically widened expansion depression.

A defined assembly of the sleeve element on the base body, and therefore a well defined effect of the anti-skid spike, is achieved in that a detent in the form of a protrusion is provided between the receiver section and the flange of the base body.

If the receiver section of the base body has a snap-in element, which in the assembled state engages a snap-in receiver of the sleeve element, it is possible to achieve that the sleeve can be assembled with comparatively small effort, but can simultaneously effectively be fixed in place, because the insertion element spreads the snap-in elements of the base body apart and secures them.

A preferred embodiment provides that the receiver section of the base body has a snap-in element and at least one slit-shaped recess in the longitudinal direction of the receiver section, and that in the assembled state the snap-in element engages a snap-in receiver of the sleeve element. By means of this it is achieved that during assembly the snap-in element of the base body can be displaced over a particularly large distance and therefore can engage the snap-in receiver particularly deeply and securely.

If the sleeve element is designed as a multi-part element, and if it has at least one further ring sleeve element, the sleeve element on the inside can be made of

a less wear-resistant cost-effective material, and the ring sleeve element of the higher value material otherwise required for the entire shell element.

Improved seating of the anti-skid spike in the tire material, which is more resistant to being torn out, is achieved in that the sleeve element has a radially outward protruding flange and/or in that the base body has at least one further flange.

An improved anti-skid effect of the anti-skid spike is achieved in that in the assembled state the insertion element is set back in respect to the sleeve element, and the sleeve element protrudes in respect to the tread surface. The sleeve element, which in this embodiment is made of a hard material or other suitable material, is more wear-resistant because of the larger surface and can dig into snow or ice particularly well because of the slight lateral tilting occurring under a load by lateral forces.

The invention will be explained in greater detail in what follows by means of the exemplary embodiments represented in the drawings. Shown are, in partial section and respectively in the disassembled state in the upper portion of the figures and in the assembled state in the lower portion of the figures, in:

Fig. 1, an anti-skid spike with a base body with a cylindrical receiver section,

Fig. 2, an anti-skid spike in accordance with Fig. 1 with a widened sleeve element,

Fig. 3, an anti-skid spike with a base body with a receiver section, which has a section in the shape of a truncated cone,

Fig. 4, an anti-skid spike with a sleeve element which has a conical passage opening in the direction toward the tread surface,

Fig. 5, an anti-skid spike with a snap-in element on the receiver section of the base body,

Fig. 6, an anti-skid spike with a slit-shaped recess in the area of the receiver section of the base body,

Fig. 7, an anti-skid spike with a sleeve element which has an expansion depression,

Fig. 8, an anti-skid spike with a sleeve element and an additional ring sleeve element,

Fig. 9, an anti-skid spike with a sleeve element protruding in respect to the tread surface and embodied as a wear element,

Fig. 10, an anti-skid spike with a base body which has two flanges (only shown in the assembled state here).

An anti-skid spike 1, such as can for example be inserted into an embedding opening of a tread surface 50 of a tire, is represented in Fig. 1. The anti-skid spike 1 has a base body 10, which has at least one flange 13 formed on its one end. In the area of the flange 13, the base body 10 has a detent 12, and at the other end a receiver section 11. The flange 13 is used for anchoring the base body 10 inside the embedding opening of the tire. The receiver section 11 is used for receiving a sleeve element 20, which extends at least partially around the receiver section 11 and has a

passage 23 corresponding to the receiver section 11. Here, the position of the sleeve element 20 on the receiver section 11 of the base body 10 is determined by the detent 12. The receiver section 11 furthermore has a recess 14, not visible in the upper part of the figure, which is used for receiving an insertion element 30 in such a way that in the assembled state the sleeve element 20 is arranged in the area around the recess 14. In the assembled state the insertion element 30 protrudes past the sleeve element 20.

The insertion element 30 is designed in the form of a pin and has a pinhead 31, adjoining that a cylindrical section 32 and a cone-shaped section 33 which, in the assembled state, engages the corresponding recess 14 of the base body 10 in such a way that a positive or non-positive connection between the inner surface of the passage 23 of the sleeve element 20 and the circumferential surface of the receiver section 11 of the base body 10 is formed.

The sleeve element 20 can be embodied in the form of a closed ring, resting with its entire surface against the receiver section 11 of the base body 10, as a ring which partially rests against it in segments, or as a clamping sleeve in the form of a slit ring. In the example shown, the sleeve element 20 has a circumferential bezel 21, 22 at one or both of its longitudinal ends, and it is preferably constructed to be rotationally symmetrical. In the assembled state it preferably terminates at the tread surface 50. The bezel 22 is used for reducing the force required for assembling the anti-skid spike 1 in the tire material. The bezel 21 sees to it that the roll-off noise is reduced. The bezels 21, 22 are preferably embodied to be identical in respect to their

geometry, which prevents confusion when assembling the sleeve element 20 on the base body 10.

In the example shown, the insertion element 30 is made of a hard material, preferably a hard alloy. In comparison to the insertion element 30, the sleeve element 20 is made of a less wear-resistant material. The wear properties of the materials of the insertion element 30 and the sleeve element 20, as well as the material of the tire, are matched to each other in such a way that during operation the length of the insertion element 30 protruding past the tread surface 50 is substantially maintained, and the sleeve element 20 and the tread surface 50 wear at the same rate. The base body 10 can be made of a material which is less wear-resistant in comparison with the insertion element 30 and the sleeve element 20. Plastic, sintered materials, ceramic materials, for example aluminum oxide, aluminum or other suitable material can be used as the material for the base body 10.

Fig. 2 shows an exemplary embodiment in accordance with Fig. 1, wherein the diameter of the sleeve element 20 is greater than the diameter of the flange 13 of the base body 10. An improved support of the anti-skid spike 1 within the insertion opening is achieved by means of this. Bending forces are distributed more evenly. Here, too, the receiver section 11 of the base body 10 preferably has a cylindrical section 18.

In comparison with the embodiments represented in Figs. 1 and 2, the embodiment variation shown in Fig. 3 has a receiver section 11 of the base body 10

with a section 17 in the shape of a truncated cone. The passage 23 of the sleeve element 20 has a geometry corresponding to this. A self-locking geometry is achieved by means of this, which furthermore is particularly manufacturing-tolerant.

In contrast to the embodiments so far described, the exemplary embodiment in Fig. 4 has a receiver section 11 with a preferably cylindrical section 18 and a detent 12. By comparison, the sleeve element 20 has a passage 23 in the form of a truncated cone, which is embodied to open in the direction toward the tread surface 50. In the assembled state, when the insertion element 30 has been inserted into the recess 14, the passage 23 receives the radially expanding material of the receiver section 11 and constitutes a positive or non-positive connection between the sleeve element 20 and the base body 10.

A further exemplary embodiment, such as is represented in Fig. 5, has a snap-in element 15 in the area of the receiver section 11 of the base body 10 which, in the assembled state, engages a snap-in receiver 25 of the sleeve element 20 and fixes it in place still rotatable or already fixed. In the course of inserting the insertion element 30 into the recess 14 it is achieved that the material of the receiver section 11 is radially stretched and is supported against the cylindrical portion of the passage 23 above the snap-in receiver 24 and in this way clamps the sleeve element 20 to the base body 10.

Here, the snap-in element 15 and/or the sleeve element 20 are laid out to be flexible in the area of the snap-in connection. The use of flexible materials is also

preferably conceivable, for example plastic materials. Also conceivable is the use of a snap-in element in the form of a resilient collar as a mounted spring element. The receiver section 11 can have a recess for receiving the snap-in element 15, so that shifting on the receiver section 11 is prevented. The snap-in receiver 24 inside the passage 23 can also be embodied as a separate snap-in insert, which is first inserted into the passage 23.

In the area of the receiver section 11 of the base body 10, the exemplary embodiment represented in Fig. 6 has a snap-in element 15 and at least one slit-shaped recess 16 in the longitudinal direction of the receiver section 11. When the insertion element 30 is inserted into the recess 14 of the base body 10, the slit area of the receiver section 11 is widened. In the process the snap-in element engages a corresponding snap-in receiver 24 in the sleeve element 20, so that a solid connection between the base body 10, sleeve element 20 and insertion element 30 in accordance with the mushrooming principle is achieved.

The embodiment of the anti-skid spike 1 represented in Fig. 7 has a base body 10 with a receiver section 11 with an initially truncated cone-shaped section 17 and an adjoining cylindrical section 18, wherein the passage 23 of the sleeve element 20 has an area corresponding to the truncated cone-shaped section 17, which is followed by a conically widening extension depression 25. In the assembled state the material of the cylindrical section 18 of the receiver section 11 is radially pressed into the extension depression 25 by the insertion of the insertion element 30, so that the

connection between the base body 10, the sleeve element 20 and the insertion element 30 is made.

In Fig. 8, the sleeve element 20 from Fig. 7 is designed in two parts and has an additional ring sleeve element 40. The ring sleeve element 40 has a conical bore 41. In its design, the base body 10 corresponds to the base body in Fig. 7 and also has a section 17 in the shape of a truncated cone and an adjoining cylindrical section 18 at the receiver section 11. In the assembled state the material of the cylindrical section 18 of the receiver section 11 is radially pressed into the conical bore 41 of the ring sleeve element 40 by the insertion of the insertion element 30, so that the connection between the base body 10, the sleeve element 20, the ring sleeve element 40 and the insertion element 30 is made.

In the exemplary embodiment represented, the sleeve element 20 has a radially outward protruding flange 26, which provides additional anchoring of the anti-skid spike 1 in the tread surface 50.

Fig. 9 shows an embodiment of the anti-skid spike 1 wherein the insertion element 30 is set back in the assembled state in respect to the sleeve element 20, and the sleeve element protrudes in respect to the tread surface 50. In this case the sleeve element 20 is made of a wear-resistant material, preferably a hard alloy. Because of this, the sleeve element can dig better into the surface of snow or ice because of the slight lateral tilting occurring under a load by lateral forces.

As shown by way of example in Fig. 10, the base body 10 can

additionally have two or more flanges 13, which lead to improved anchoring in the embedding opening of the tread surface 50.

The exemplary embodiments shown are based on an assembly arrangement wherein the insertion element 30 is inserted into the side of the receiver section 11 of the base body 10 from the side facing away from the flanged side of the base body 10. However, embodiments are also conceivable wherein the insertion element 30 can be inserted from the direction of the flanged side of the base body 10. It is furthermore conceivable to either first assemble the insertion element 30 in the recess 14 in the receiver section 11, and then the sleeve element 20 over the receiver section 11 or, vice versa, first the sleeve element 20 over the receiver section 11 and, in a second step, the insertion element 30 in the recess 14. With truncated cone-shaped receiver sections 11 as in Fig. 3, the first variation is preferably employed, the second variation with types of the anti-skid spike 1 wherein it is intended to achieve the mushrooming of the base body 10, as represented in Figs. 5 to 8. The anti-skid spike 1 has essential characteristics of the claims in these variations of the assembly.

As a whole it is achieved by means of the described embodiments that a solid connection between the base body 10, the sleeve element 20 and the insertion element 30 is achieved. A cost-effective material selection is made possible at the same time. Also, material combinations, which so far have not been or could not be used, can be realized.

Claims

1. An anti-skid spike (1) which can be inserted into an embedding opening in a tread surface (50), for example of a tire, having an insertion element (30) and a base body (10) with an opening (14) for receiving the insertion element (30), characterized in that

a receiver section (11) is formed on the base body (10), which is at least partially enclosed by a sleeve element (20), and that the sleeve element (20) is arranged at least in part in the area around the recess (14) in the assembled state.

2. The anti-skid spike (1) in accordance with claim 1,

characterized in that

in the assembled state the insertion element (30) projects past the sleeve.

3. The anti-skid spike (1) in accordance with one of claims 1 or 2,

characterized in that

the insertion element (30) has a cone-shaped section (33) which, in the assembled state, engages a corresponding recess (14) in the base body (10), and that a positive or non-positive connection between the sleeve element (20) and the receiver section (11) of the base body is formed (10).

4. The anti-skid spike (1) in accordance with one of claims 1 to 3,
characterized in that

the insertion element (30) is made of a hard material, preferably a hard
alloy, and the sleeve element (20) of a material of lesser wear resistance in comparison
with the insertion element (30).

5. The anti-skid spike (1) in accordance with one of claims 1 to 4,
characterized in that

the base body (10) is made of a material which is less wear-resistant in
comparison with the insertion element (30) and the sleeve element (20).

6. The anti-skid spike (1) in accordance with one of claims 1 to 5,
characterized in that

the sleeve element (20) is embodied as a closed ring resting on the entire
surface of the receiver section (11) of the base body (10), as a ring partially resting in
segments on it, or as a clamping sleeve in the form of a slit ring.

7. The anti-skid spike (1) in accordance with one of claims 1 to 6,
characterized in that

the sleeve element (20) has a bezel (21, 22) at one or both of its ends on
the longitudinal side, which encircles it at least partially.

8. The anti-skid spike (1) in accordance with one of claims 1 to 7,

characterized in that

the sleeve element (20) is constructed to be rotationally symmetrical.

9. The anti-skid spike (1) in accordance with one of claims 1 to 8,

characterized in that

the base body (10) has an flange (13) formed on it, and the diameter of the sleeve element (20) is greater than the diameter of the flange (13) of the base body (10).

10. The anti-skid spike (1) in accordance with one of claims 1 to 9,

characterized in that

the receiver section (11) of the base body (10) and the passage (23) in the sleeve element (20) corresponding to it are designed to be cylindrical,

or

that the receiver section (11) of the base body (10) and the passage (23) in the sleeve element (20) corresponding to it are designed to be in the form of a truncated cone,

or

that the receiver section (11) of the base body (10) is designed to be cylindrical, and the corresponding passage (23) of the sleeve element (20) in the form

of a truncated cone,

or

that the receiver section (11) of the base body initially has a truncated cone-shaped section (17) and an adjoining cylindrical section (18), wherein the passage (23) in the sleeve element (20) has an area which corresponds to the truncated cone-shaped section (17) of the receiver section (11), which is followed by a conically widened expansion depression (25).

11. The anti-skid spike (1) in accordance with one of claims 1 to 10,
characterized in that
a detent (12) in the form of a protrusion is provided between the receiver
section (11) and the flange (13) of the base body (10).

12. The anti-skid spike (1) in accordance with one of claims 1 to 11,
characterized in that
the receiver section (11) of the base body (10) has a snap-in element (15),
which in the assembled state engages a snap-in receiver (24) of the sleeve element (20).

13. The anti-skid spike (1) in accordance with one of claims 1 to 12,
characterized in that
that the receiver section (11) of the base body (10) has a snap-in element

(15) and at least one slit-shaped recess (16) in the longitudinal direction of the receiver section (11), and that in the assembled state the snap-in element (15) engages a snap-in receiver (24) of the sleeve element (20).

14. The anti-skid spike (1) in accordance with one of claims 1 to 13,
characterized in that
the sleeve element (20) is designed as a multi-part element, and has at least one further ring sleeve element (40).

15. The anti-skid spike (1) in accordance with one of claims 1 to 14,
characterized in that
the sleeve element (20) has a radially outward protruding flange (26)
and/or that the base body (10) has at least one further flange (13).

16. The anti-skid spike (1) in accordance with one of claims 1 to 15,
characterized in that
in the assembled state the insertion element (30) is set back in respect to the sleeve element (20), and the sleeve element (20) protrudes in respect to the tread surface (50).